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BA/WTR
WR SD
Mail Stop 60189

MAY 22 1995

Memorandum

To: ARD, Refuges and Wildlife (60130)
Attention: Maruy Wright

From: Chief, Division of Water Resources

Subject: 1994-1995 Annual Water Use Report/Management Plan

The subject report for Lake Andes National Wildlife Refuge has been reviewed and approved.

Please extend our thanks to Refuge personnel for the timely submission of this report.

Cheryl Lewis

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1995 ANNUAL WATER MANAGEMENT PLAN
AND
1994 WATER CONDITIONS AND USAGE

LAKE ANDES NATIONAL WILDLIFE REFUGE COMPLEX
LAKE ANDES, SD

WATER UNIT: Lake Andes

I. Introduction

Lake Andes is a 4730 acre meandered lake whose water level depends entirely upon annual runoff. Two dikes divide the lake into three units, the North, Center, and South. Stop-log water control structures are located within each dike; however, the lack of a permanent water supply precludes any water level manipulations.

Drainage area size and surface acres for each unit of Lake Andes are shown below. Maximum and average depth figures were determined in 1962.

Unit	Drainage Area Acres		Surface Acres of Water	Water Capacity (Acre Feet)	Depth/full Max	Avg
South	20,000	24%	1,760	16,159	13.5	11.5
Center	11,000	14%	2,359	18,000	14.5	12.9
North	53,000	62%	611	3,015	10.5	9.1
TOTAL	84,000	100%	4,730	37,174	--	--

In 1922, Congress passed a bill establishing a high water elevation of 1437.25 feet msl for Lake Andes via the construction of an artificial outlet on the South Unit. This level was established following local complaints about flooding around the lake. The Fish and Wildlife Service received the right to flood the meandered lake bed of Lake Andes in an easement acquired in 1939 from the State of South Dakota.

II. Objectives

Four primary goals and associated objectives exist for the Lake Andes National Wildlife Refuge.

Goal I. ENDANGERED SPECIES
Preserve, restore, and enhance federally listed endangered and threatened species and the habitats upon which they depend.

Objectives - Provide and maintain habitat for wintering bald eagles.

Goal II. MIGRATORY BIRDS
Provide the life requirements of waterfowl and other migratory birds.

Objectives - Develop and maintain waterfowl habitat with the emphasis on waterfowl production. Also maintain a portion of the area as a refuge closed to hunting of migratory waterfowl.

Goal III. OTHER WILDLIFE
Preserve a natural diversity and abundance of fauna and flora on refuge lands.

Objectives - Maintain suitable habitat for the production and maintenance of nonmigratory birds, mammals, and other wildlife.

Goal IV. INTERPRETATION AND RECREATION
Provide a range of opportunities for compatible wildlife/wildlands-oriented interpretation and recreation.

Objectives - Maintain interpretative facilities for the use by the visiting public. Provide sport fishing opportunities and public access as wetland conditions dictate. Provide opportunities for hunting.

III. 1994 Water Conditions

Total precipitation for 1994 was 22.70 inches, 1.33 inches above normal. The winter was relatively mild and open with sporadic moderate snowfalls. Minor snowmelt runoff contributed to the partial filling of all three units. Precipitation after ice-out was considered normal resulting in subtle decreases in pool water elevations.

1994 Lake Andes Water Levels - Feet MSL

Date	North Unit	Center Unit	South Unit
02/01	FROZEN	FROZEN	FROZEN
03/09	1437.5	1437.0	1435.3
04/13	1436.5	1436.4	1436.3
05/01	1436.7	1436.5	1436.6
06/10	1436.6	1436.6	1436.4
07/11	1436.3	1436.3	1436.2
08/16	1436.2	1436.1	1435.4
09/19	1435.7	1435.5	1435.5
10/31	1435.6	1435.4	1435.3
11/25	FREEZE-UP		

IV. Ecological Effects

Lake Andes is rebounding from the drought period from 1987 through 1992. During this time, all three units came very close to becoming void of water. The low water conditions resulted in an increase in aquatic vegetation throughout the lake. In addition, limited rough fish control was achieved by fish die offs in both the winter and summer periods of 1992 and 1993. The remaining rough fish were primarily found in the south unit.

Heavy precipitation occurred early in 1993 resulting in significant runoff events causing significant increases in water elevations in both the north and center units. Water clarity increased dramatically in the center unit due primarily to a reduced rough fish population and increased aquatic plant community. Water clarity in the south unit remained low with respect to the center unit. Waterfowl were selecting the center unit for their daily needs. Other water bird use also selected the center unit for forage, nesting and loafing areas.

Unfortunately, this condition only lasted for a few short weeks as precipitation continued to fall. Soon, water was flowing over the stop-log boards between the center and south units resulting in rough fish entering the center unit once again. Unit levels during 1994 remained steady to slightly decreasing when compared to the 1993 levels. Slight decreases in the amount of visible aquatic plant life was noticed in 1994.

Colonial nesting birds began to re-establish active rookeries once again in the Johnson's Bay area and a new rookery in the Owen's Bay area. Primary nesters in the new rookeries were, black-crowned knight herons, cattle egrets, great egrets, cormorants, and great-blue herons.

V. 1995 Water Management Objectives

Management objectives for 1995 are to contain as much runoff as possible in Lake Andes. Water in excess of the 1437.25 elevation mandated by Congress will continue to be released from the outlet on the South Unit.

WATER UNIT: Owens Bay

I. Introduction

The Owens Bay Unit is a 240 acre marsh unit separated by a dike from the South Unit of Lake Andes. A stop-log water control structure is located in the dike to allow water releases into Lake Andes.

Owens Bay, in addition to water from natural runoff, is maintained by a free flowing artesian well. The well, drilled in 1957, originally had a 1000 gpm flow and water right. Well shutdowns during the 1973 DVE outbreak resulted in casing destruction and new casing had to be installed. The new casing reduced the well opening from 12" to 8" and dropped the flow to approximately 450 gpm.

In 1986, Ducks Unlimited funded the drilling of a new 12" artesian well and the old well was capped. The new well has a 800-1000 gpm flow. The well distribution box and pipeline supplying the Prairie Ponds were also replaced. In 1987 the four water control structures on the prairie ponds were retrofitted with new screw gates for better water control.

II. Objectives

Owens Bay water management objectives are to store annual runoff and artesian well water to be used primarily as waterfowl habitat. Waterfowl production is the primary objective on Owens Bay. The emphasis is to provide excellent breeding pair habitat and permanent brood water. Secondary objectives include providing waterfowl migrational habitat and benefits for marsh and water birds, shorebirds, gulls, terns, and resident wildlife.

III. 1994 Water Conditions

Spring snowmelt resulted in the Bay reaching pool capacity in March. The pool remained full until the month of June and continued to slowly decline up to freeze-up.

Although the artesian well has a 800-1000 gpm flow, it cannot completely offset water losses to evaporation and percolation under normal precipitation conditions. In addition to these water losses, we are losing a considerable amount of water to the South Unit via piping and seeping through existing dikes.

1994 Water Levels - Owens Bay

Date	Water Level
03/09	1443.2
04/13	1442.8
05/01	1442.9
06/10	1442.7
07/11	1442.2
08/16	1442.0
09/19	1441.6
10/31	1441.9
11/02	frozen
Pool Bottom	1436.52
Full Pool Elevation	1442.12

IV. Ecological Effects of the Past Years Levels on Owens Bay

The Pool level remained high throughout 1994 resulting in many increased wildlife uses. A new rookery was established by cattle egrets, great egrets, great-blue herons and black crowned knight herons. This rookery was made possible by cottonwood trees becoming established at the perimeter of the Bay during the previous drought years and subsequent reflooding. In addition, muskrats have increased dramatically from less than ten huts counted in 1991 to over 100 huts counted in 1994. The muskrats are a good indicator of the emergent vegetation existing within the Bay. They are providing cattail control resulting in increased interspersion and greater waterfowl attractability.

V. 1995 Water Management Objectives

Water management activities for 1995 are to contain as much runoff as possible in Owens Bay. The artesian well will continue to run at full flow in order to offset as much annual evaporation as possible.

WATER UNIT: Broken Arrow Waterfowl Production Area

I. Introduction

The Broken Arrow WPA is a 2650 acre tract in Douglas and Charles Mix Counties, SD. Two drainage systems existed on the property when purchased. The Mud Lake Drain has an upstream watershed of 25,600 acres, while the second system, the Joubert Drain, has a 12,320 acre watershed. Five ditch plugs or low head dams, with concrete stop-log control structures, were installed in 1979 along the drainage ditches, two on the Mud Lake ditch and the remaining three on the Joubert drain. Dam #6 was constructed below dam #2 on the Mud Lake drain in 1984. Dam #7 on the Joubert Drain was constructed during the fall of 1986 in cooperation with Ducks Unlimited who funded the project design and construction. A water rights permit for the storage of 131.2 acre feet of water was granted by the South Dakota Department of Water and Natural Resources. The impoundment at capacity covers 56.4 surface acres. The development increased the quantity of pair habitat by creating 5.9 miles of shoreline. The maximum depth is 6.5 feet. Design specifications for the seven dams are as follows.

Embankment Volume YD^3	High Water Contour	Surface Acres	Acre-feet Impounded
Dam #1 - 76	Unk	6.2	5.7
Dam #2 - 755	Unk	27.9	82.6
Dam #3 - 2761	Unk	43.6	163.0
Dam #4 - 586	Unk	34.7	88.3
Dam #5 - 137	Unk	6.3	5.2
Dam #6 - 900	Unk	30.0	Not determined
Dam #7 - 5470	1526.0	56.4	131.2
	TOTAL	205.1	476.0

The capability to manipulate water levels is very limited on the Broken Arrow WPA. Impoundments can be drawn down as objectives dictate. However, to reflood depends on spring runoff and no capability to flood when desired is possible.

II. Objectives

The storage of annual runoff in impoundments is to be used primarily as waterfowl production habitat. The habitat provided also benefits marsh and water birds, shorebirds, gulls, terns, and raptorial birds. Secondary benefits are provided to resident wildlife and livestock used for management purposes. Water excess to storage needs is allowed to drain through the system.

III. 1994 Water Conditions

The winter of 1993-94 was relatively mild with moderate snowpack in the broken arrow drainage. Total precipitation is not monitored on site, however it was similar to that of Lake Andes NWR which was near normal.

IV. Ecological Effects of the Past Years Water Levels on the Broken Arrow WPA

All impoundments have experienced excellent growth in the pool bottoms by annual weeds and hydric plant species. Portions of the record amount of water that occurred in 1993 were retained in all pools except dam #3. This structure washed out in 1993 and was not repaired until 1994. The pool was considered in a draw-down condition prior to and after the repair of this structure. Dramatic aquatic plant growth resulted from this draw-down event and shorebird use was high. Subsequent reflooding of this pool did not occur after the structure was repaired due to a lack of water coming into the system. Other pools remained in good condition throughout 1994. Waterfowl use has increased in recent years from incidental observations.

V. 1995 Water Management Objectives

Water management objectives for 1995 are to contain as much spring runoff as possible in all pools.

Five water control structures have been retrofitted with new screw gates allowing more efficient water management. They replaced the non-functional stop-log liftgate structures. This project is dependent on 1995 precipitation amounts.

WATER UNIT: Karl E. Mundt National Wildlife Refuge

The Karl E. Mundt NWR borders the Missouri River in Gregory County. The refuge was established in 1974 to protect habitat important to wintering bald eagles. The only water on the unit itself is four small (less than 1 acre) stock ponds that are used in conjunction with the grazing program. There is also a free-flowing artesian well that provides water for a small 1/2 acre pond.

There presently is no active management of water on the Karl E. Mundt Refuge.

WATER UNIT: Sherman Waterfowl Production Area
SD Water Permit No. 5251-3

This water permit is for sufficient runoff water annually to fill the Sherman WPA to elevation 1591.7 feet msl. The Sherman WPA is located in a portion of the W½ Section 3; E½NE¼ Section 9; NW¼NW¼ Section 10; all in T. 98 N., R. 66 W. The permit establishes first priority to 271 feet of an undivided interest in a total of 323 acre feet of water stored in a natural basin on both the Sherman WPA and private land at elevation 1591.7 feet msl. The water appropriated shall be used for the purpose of providing fish and wildlife habitat.

WATER UNIT: Varilek Waterfowl Production Area
SD Water Permit No. 5250-3

This water permit is for sufficient runoff water annually to fill the Varilek WPA to elevation 1614.0 feet msl. The Varilek WPA is located in the E½ Section 11, T. 98 N., R. 66 W., Charles Mix County, SD. The permit establishes first priority to 139 acre feet of an undivided interest in a total of 190 acre feet of water stored in a natural basin both on the Varilek WPA and private land at elevation 1614 feet msl. The water appropriated is used for the purpose of providing fish and wildlife habitat.